Mid-America Grain Study

Presenter Kenneth Train

This study analyzed data from two surveys of shippers and developed mixed logit models from this data to determine price elasticity. The presenter highlighted the importance of understanding price elasticities of shipments on the inland waterway system. Motivation for this study was to develop a grain transportation model that is academic, usable and reflective of how shippers make decisions on what mode of transportation to use. The first model, termed the "tow cost" model analyzed 1,800 shipments. For each shipment the model determines the quantity that is being shipped and calculates the cost of shipment by barge and by the least cost alternative. The model stipulates that grain shipments would stay on the barge until the cost rises up to the least cost overland alternative – then shipments move over land by alternative mode.

The problem with this model is that it extremely convenient but not realistic. Two main problems were pointed out. First, as the cost of shipping by barge rises, one would expect to see a gradual migration of shipments to the least cost overland alternative--this is not the case in the tow cost model. The second limitation is that even though it may be cheaper to ship using the least cost overland alternative, some shippers still choose not to switch for various reasons.

The "essence" model addresses the first of those limitations by developing an elasticity of quantity shipped with respect to barge shipments costs. The essence model removes the rigidity of the price at which shippers decide to switch from the barge shipment mode and thus produces a downward sloping demand curve. There are some general assumptions about the shape of the demand curve (convex, concave or straight line) but the model in general modifies the shape of the demand curve from the initial "tow cost" model. Such changes have major implications because the benefits of a project are entirely determined by the shape of the demand curve. For example, a project whose purpose is to reduce barge costs caused by congestion could be justified under the "tow cost model" and yet not be justified if the "essence" model is assumed. The "essence" model typically produces fewer benefits due to the downward sloping demand curve.

The "survey" model addresses other factors that make shippers continue to use barge transportation despite the cost being higher. The demand curve for the survey model is estimated based on data collected through surveys and is not assumed. The demand curve for the "survey" model shows that there would still be a demand for barge transportation even when shipment costs are greater than the least cost overland alternative. Just like the "essence" model, some benefits are lost. However extra benefits are generated from shippers who still stay on barge after barge costs exceeds overland costs. So the model suggests that in reality benefits could go either way.

Finally, there are 1,800 separate demand elasticities for these models--one for each shipper. Choosing a single elasticity would require an abstraction. The current study uses a separate elasticity for each shipper as revealed by their previous choices.

Questions and Issues

- Participants requested the definition of a shipper and noted that the term was being used rather loosely. Participants also wondered whether there existed a list or directory of

shippers that use the waterway. The hope would to use such a list as a population from which to select the survey sample. In response the presenter indicated that the survey population was obtained from a USDA list of elevators and supplemented with a trade association membership list. The presenter further indicated that the research team had not yet defined the universe of shippers.

- As a follow up one participant noted that in North Dakota, there are 400 elevators and only 5 shippers. The participant also noted that the definition of shipper is not exactly clear. In the past, shippers were always thought of as originators of grain. Now, shipping decisions, modal choice, is made by somebody other than the originator.

- One attendee pointed out that there should be a differentiation between shippers and carriers (they are not necessarily the same). The presenter acknowledged this and reiterated that the term shipper was not strictly defined.

- A concern was raised about self-selection bias and whether the survey was based on a random sample. The presenter acknowledged such concerns but pointed out that one has yet to define what the universe of shippers is to be able to determine whether this was a biased sample. With regards to the randomness of the sample, it was agreed that there was a self selection bias on responders. The presenter further explained that the study puts more effort into getting more representative samples.

- In one participant's opinion, the study team needs to find a way to collect a sample of observations that is truly representative of the river shipment population and its alternative modes, routes and markets. The participant further suggested that the current study was woefully short on river shipments, though the anticipated data on 100 barge shipments if provided would help greatly.

- Considering current day elevators going out of business, a question was raised on whether grain elevators should be the target survey participants? In response it was indicated that what the study was aiming for was a model of the underlying decision process. It was not clear whether it really matters who makes that decision. The general understanding is that shippers describe the process in the same way.

- A question was raised on how travel times are incorporated into the analysis. In response, it was mentioned that changes in travel times are only reflected through costs in the current models, while this study shows they have an independent effect.

- An issue was raised on whether the study considers a shift to trucking. In response, the presenter indicated that there is a limitation on how much the highway can handle. The presenter indicated that a shift to trucking can be captured through programming an increase cost of trucking, which would then feed back into the model.

- One participant questioned whether it was reasonable to assume that barge and rail elasticities are the same. The presenter suggested that the barge and rail elasticities would be similar because a person, having chosen to ship by barge, would likely be less time sensitive. Since rail transportation is also relatively slow, one can infer that the same person's rail elasticity would be similar.

- Referring to the term "elasticity," the presenter cautioned that the term was sometimes used too loosely. For this study it referred to the percent of shippers who switched mode of shipment.

- One participant suggested that investment be considered not only for possible cost effects but also for potential service quality effects. In other words, if you have an investment, it will not only affect costs. It may also affect the service quality. Therefore the shift may also occur as a result of service quality affects.

- One participant recommended that the study also investigate shipper's option based on the question, "what would you have done if the costs decreased by say 10 percent?" The participant suggested that a question would provide some information on the downside.

Other Questions and Issues Not Directly Addressed

- With regards to survey responses, are participants responding to a short-term closure, and change in cost?

- How big is a shipment?

- Is it true that for a large numbers of shippers, there is no alternative?

- May want to include stated preference in consistent way.

- How did grain get to that particular elevator? Is there a discount/premium that starts commodity down a particular path? Is there a precursor event?